

What is claimed is:

1. A plasma processing method having a first and a second plasma processing step carried out in a single chamber,
5 wherein deposits are substantially accumulated in the chamber during the first plasma processing step and substantially no deposits are accumulated in the chamber during the second plasma processing step, the method comprising the step of:

10 dry cleaning an inside of the chamber by using a dummy substrate between the first and the second plasma processing step,

wherein the dry cleaning step is performed by supplying into the chamber a deposit removing gas for
15 removing the deposits produced in the chamber during the first plasma processing step and a dummy substrate etching gas capable of etching the dummy substrate.

2. The plasma processing method of claim 1, wherein the
20 deposit removing gas is an oxygen gas, a nitrogen gas, a hydrogen gas, an ammonia gas or a combination thereof.

3. The plasma processing method of claim 1, wherein the
25 dummy substrate etching gas is one of a CF-based gas, a CHF-based gas and a SF-based gas.

4. The plasma processing method of claim 1, wherein the deposit removing gas is an oxygen gas and the dummy substrate etching gas is CF₄.

5 5. The plasma processing method of claim 1, wherein a surface of the dummy substrate is made of a material having silicon.

6. A plasma processing method comprising the steps of:
10 performing a plasma processing on an object to be processed in a chamber;

after the step of performing the plasma processing, dry cleaning an inside of the chamber by using a dummy substrate,

15 wherein the dry cleaning step is performed by supplying into the chamber a deposit removing gas for removing deposits produced in the chamber during the step of performing the plasma processing and a dummy substrate etching gas capable of etching the dummy substrate, and

20 wherein a ratio of a flow rate of the dummy substrate etching gas to that of the deposit removing gas is not less than about 0.14% but not larger than about 7.1%.

7. The plasma processing method of claim 6, wherein a
25 high frequency power applied to one of a top and a bottom electrode during the step of performing the plasma

processing ranges from about 3.18 W/cm² to about 4.78 W/cm².

8. The plasma processing method of claim 6, wherein the deposit removing gas is an oxygen gas, a nitrogen gas, a
5 hydrogen gas, an ammonia gas or a combination thereof.

9. The plasma processing method of claim 6, wherein the dummy substrate etching gas is one of a CF-based gas, a CHF-based gas and a SF-based gas.

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10. The plasma processing method of claim 6, wherein the deposit removing gas is an oxygen gas and the dummy substrate etching gas is CF₄.

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11. The plasma processing method of claim 6, wherein a surface of the dummy substrate is made of a material having silicon.

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12. The plasma processing method of claim 6, wherein a first and a second plasma processing step is performed in the chamber, the deposits being substantially accumulated in the chamber during the first processing step and substantially no deposits being accumulated in the chamber during the second processing step, and the dry cleaning step
25 is performed between the first and the second plasma processing step.

13. An apparatus for performing a plasma processing on an object to be processed, comprising:

a chamber in which a first and a second plasma process
5 is carried out, deposits being substantially accumulated in the chamber during the first plasma process and substantially no deposits being accumulated in the chamber during the second plasma process; and

10 a gas supply system for supplying into the chamber a deposit removing gas for removing deposits produced in the chamber and a dummy substrate etching gas capable of etching a dummy substrate during a dry cleaning process carried out by using the dummy substrate after performing the plasma processing on the object.

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14. The apparatus of claim 13, wherein the deposit removing gas is an oxygen gas, a nitrogen gas, a hydrogen gas, an ammonia gas or a combination thereof.

20 15. The apparatus of claim 13, wherein the dummy substrate etching gas is one of a CF-based gas, a CHF-based gas and a SF-based gas.

16. The apparatus of claim 13, wherein the deposit
25 removing gas is an oxygen gas and the dummy substrate etching gas is CF₄.

17. The apparatus of claim 13, wherein a surface of the dummy substrate is made of a material having silicon.

5 18. An apparatus for performing a plasma processing on an object to be processed, comprising:

a chamber in which the plasma processing on the object is performed; and

10 a gas supply system for supplying into the chamber a deposit removing gas for removing deposits produced in the chamber and a dummy substrate etching gas capable of etching a dummy substrate during a dry cleaning process carried out by using the dummy substrate after performing the plasma processing on the object,

15 wherein a ratio of flow rate of the dummy substrate etching gas to that of the deposit removing gas during the dry cleaning process is not less than about 0.14% and not larger than about 7.1%.

20 19. The apparatus of claim 18, wherein a high frequency power applied to one of a top and a bottom electrode during the plasma processing ranges from about 3.18 W/cm^2 to about 4.78 W/cm^2 .